

Key Parameters

V_{RRM}	=	2300 V
I_{FAVM}	=	1140 A
I_{FSM}	=	13.5 kA
V_{F0}	=	0.83 V
r_F	=	0.30 mΩ

Avalanche Rectifier Diode

5SDA 10D2303

Doc. No. 5SYA 1120 - 01 Apr-98

Features

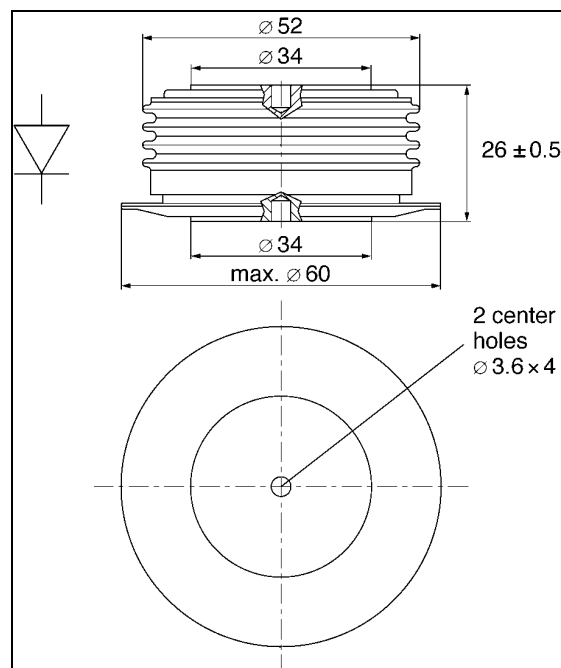
- Optimized for line frequency rectifiers
- Low on-state voltage, narrow V_F -bands for parallel operation
- Self protected against transient overvoltages
- Guaranteed maximum avalanche power dissipation
- Industry standard housing

Blocking

Part number	5SDA 10D2303	5SDA 10D2003	5SDA 10D1703	Condition
V_{RRM}	2300	2000	1700	$f = 50 \text{ Hz}$ $t_p = 10 \text{ ms}$
V_{RSM}	2530	2200	1870	$t_p = 10 \text{ ms}$ $T_j = 160^\circ\text{C}$
I_{RRM}	$\leq 50 \text{ mA}$			V_{RRM} $T_j = 160^\circ\text{C}$
P_{RSM}	$\leq 70 \text{ kW}$			$t_p = 20 \mu\text{s}$ $T_j = 45^\circ\text{C}$
	$\leq 50 \text{ kW}$			$t_p = 20 \mu\text{s}$ $T_j = 160^\circ\text{C}$

Mechanical data

F_M	Mounting force	min.	10 kN
		max.	12 kN
a	Acceleration		
	Device unclamped	50 m/s ²	
	Device clamped	200 m/s ²	
m	Weight	0.25 kg	
D_s	Surface creepage distance	30 mm	
D_a	Air strike distance	20.5 mm	



On-state

I_{FAVM}	Max. average on-state current	1140 A	Half sine wave, $T_c = 85^\circ\text{C}$	
I_{FRMS}	Max. RMS on-state current	1790 A		
I_{FSM}	Max. peak non-repetitive surge current	13.5 kA	$t_p =$	10 ms
		14.5 kA	$t_p =$	8.3 ms
I^2t	Limiting load integral	$910 \cdot 10^3 \text{ A}^2\text{s}$	$t_p =$	10 ms
		$875 \cdot 10^3 \text{ A}^2\text{s}$	$t_p =$	8.3 ms
V_{F0}	Threshold voltage	0.83 V	$I_F =$	1000 - 3000 A
r_F	Slope resistance	0.30 mΩ		
V_{Fmin}	On-state voltage	1.20 V	$I_F =$	1800 A
V_{Fmax}	On-state voltage	1.35 V		

$T_j = 160^\circ\text{C}$
 After surge:
 $V_R \approx 0\text{V}$
 $T_j = 160^\circ\text{C}$
 $T_j = 25^\circ\text{C}$

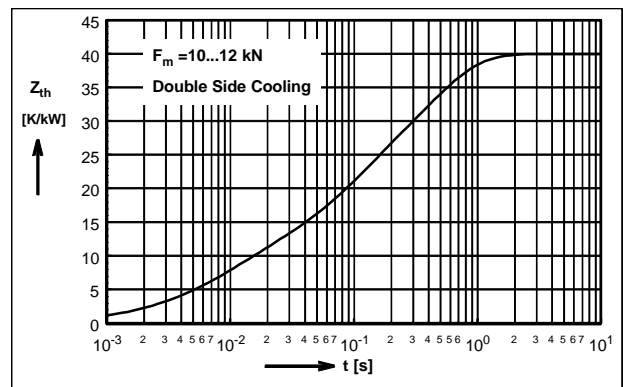
Thermal

T_j	Storage and operating junction temperature range	-40...160°C	
R_{thJC}	Thermal resistance junction to case	80 K/kW	Anode side cooled
		80 K/kW	Cathode side cooled
		40 K/kW	Double side cooled
R_{thCH}	Thermal resistance case to heat sink	16 K/kW	Single side cooled
		8 K/kW	Double side cooled

Analytical function for transient thermal impedance:

$$Z_{thJC}(t) = \sum_{i=1}^4 R_i(1 - e^{-t/t_i})$$

i	1	2	3	4
R_i (K/kW)	20.95	10.57	7.15	1.33
τ_i (s)	0.396	0.072	0.009	0.0044



For a given case temperature T_c at ambient temperature T_a the maximum on-state current can be calculated as follows:

$$I_{FAVM} = \frac{-V_{F0} + \sqrt{(V_{F0})^2 + 4 \cdot f^2 \cdot r_f \cdot P}}{2 \cdot f^2 \cdot r_f}$$

I_{FAVM} (A) P (W) V_{F0} (V) r_f (Ω)
 T_{max} (°C) T_c (°C) T_a (°C)
 R_{thja} (K/kW) R_{thJC} (K/kW)

where $P = \frac{T_{Jmax} - T_c}{R_{thjc}}$ or $P = \frac{T_{Jmax} - T_a}{R_{thja}}$

$f^2 =$ 1 for DC current
 2.5 for half-sine wave
 3.1 for 120° el., sine
 6 for 60° el., sine

